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(71) Applicant(s)
Vision Innovations Limited

(Incorporated in the United Kingdom)

8 Windmill Drive, Clapham Common, LONDON, SW4 9DE, United Kingdom

(72) Inventor(s)
Edmond Latimer Rub

(74) Agent and/or Address for Service
Reddie & Grose
16 Theobalds Road, LONDON, WC1X 8PL, United Kingdom

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US 3745966 A

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(54) **Display of information**

(57) Devices and methods for displaying images encrypting images and decrypting images are described. The device comprises a set of at least two patterned templates, at least one of which templates being at least partially pervious to vision, the templates being movable independently of each other into predetermined positions and/or orientation(s) with respect to each other in superposed relationship so that the combined patterns form the desired image(s), wherein the pattern on at least one template is wholly unrelated to any desired image(s) and wherein the pattern(s) on the other templates represents the desired image(s) in an incomplete and unrecognisable form. The or each pattern comprises a plurality of spaced pattern elements, the desired image(s) being formed by the juxtaposition and/or the superposition of the pattern elements as the templates are superposed. The templates may be transparent and may have a planar or curved form. The templates may be rotated relative to each other (Figure 3) in an arrangement wherein movement may be temporarily interrupted when a desired image is displayed. Alternatively, the templates may be formed on two loops (Figure 4). The templates may be illuminated. Further a first pattern may be broadcast on a T.V. screen, with the second pattern being on a translucent template held before the screen. Furthermore, one template may be machine readable with the other template held in a computer. Thus the device may be used for entertainment, advertising or security purposes.

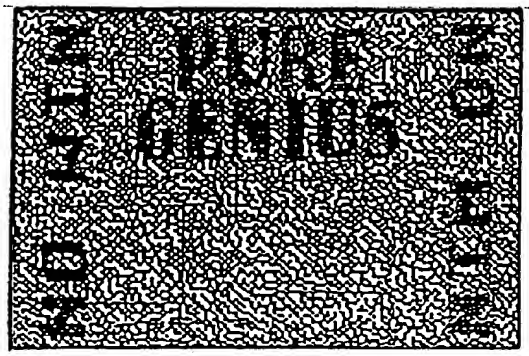

FIG. 2.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

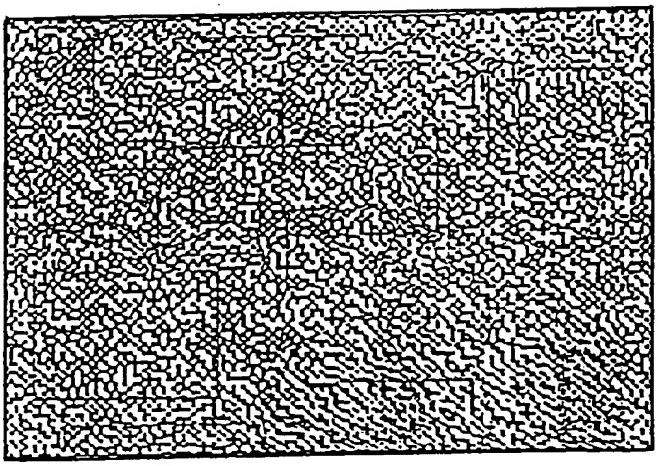

FIG.1A

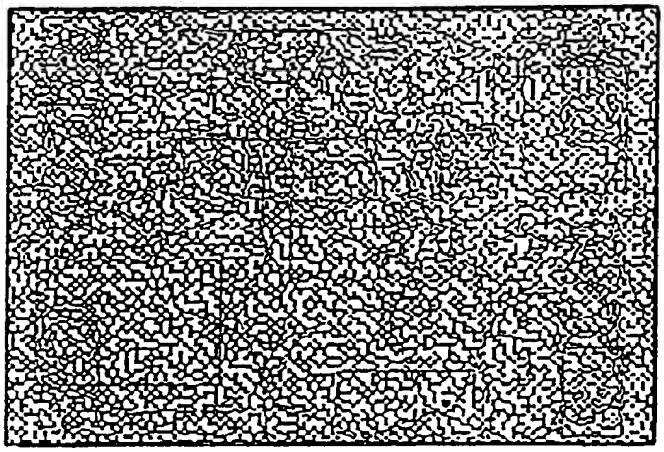

FIG.1B.

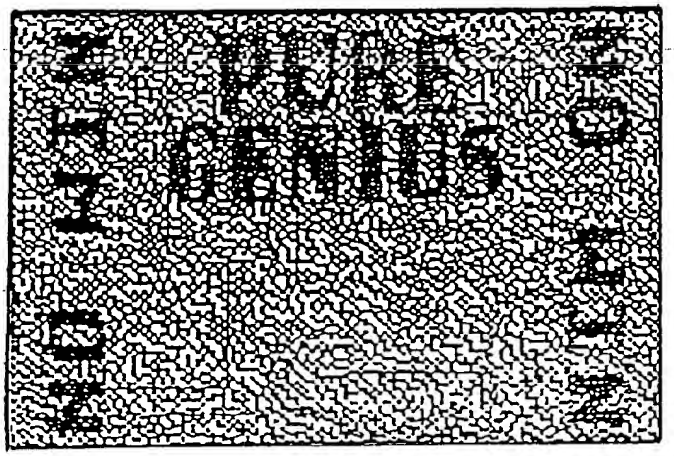

FIG.2.

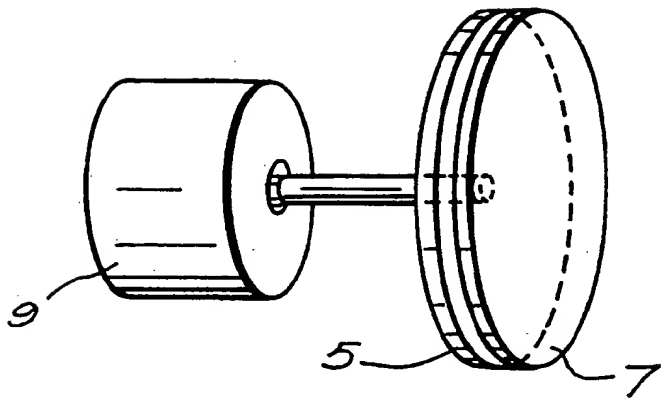

FIG. 3.

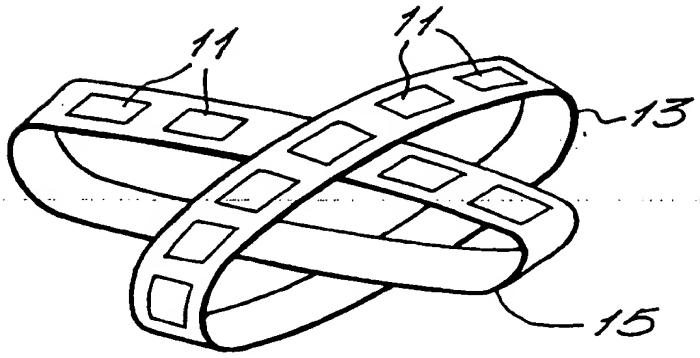

FIG. 4.

IMPROVEMENTS IN AND RELATING TO THE DISPLAY OF INFORMATION

This invention relates to devices and methods for displaying information in the form of an image, or picture.

Display devices in the form of novelty articles are known in which a desired image can be produced by the superposition of a number of elements each bearing a portion of the desired image. With such devices it is possible to discern the nature of the desired image from a single element, even if there are many elements each bearing only a small portion of the image.

In accordance with the present invention a device for displaying at least one desired image comprises a set of at least two patterned templates, at least one of the templates being at least partially pervious to vision, the templates being movable independently of each other into predetermined positions and/or orientation(s) with respect to each other in superposed relationship so that the combined patterns form the desired image(s), wherein the pattern on at least one template is wholly unrelated to any desired image(s) and wherein the pattern(s) on the other templates represents the desired image(s) in an incomplete and unrecognisable form.

With such a device, which may comprise only two patterned templates, it is not possible to discern the nature of a desired image from one template, because the pattern thereon is wholly unrelated to the desired image, nor from the other template without reference to the unrelatedly-patterned template because the desired image is encrypted using the unrelated pattern. Thus, such devices are suitable for encrypting and relaying confidential images or information. Preferably the patterns on the templates comprise a mass of irrelevant detail surrounding the desired image(s) in order further to render any desired image unrecognisable.

Without being in possession of both or all of the templates it is therefore impossible for an unauthorised individual to discern the image, or information.

Such a device may also be used as an eye-catching moving advertising poster or billboard as a novelty article, promotional or educational article, sign, game and the like.

A method of displaying at least one desired image in accordance with the invention comprises reducing the desired image(s) to an incomplete and unrecognisable pattern on at least one template by subtracting from the desired image(s) components thereof in dependence on the pattern on at least one other template, the pattern on the said other templates being wholly unrelated to the desired image(s), at least one of the templates being at least partially pervious to vision, and moving the templates into predetermined positions and/or orientations(s) with respect to each other in superposed relationship so that the combined patterns form the desired image(s).

At least one of the templates may be transparent, semi-transparent or pierced with holes so that when the templates are placed in superposition the pattern(s) on underlying templates can be seen through the uppermost patterned templates. The device, when used as an advertising sign, may be backlit so as to make the sign more eye-catching, and means may be provided to move the templates relative to one another to provide an ever-changing and eye-catching display caused by the patterns interacting. When the templates reach a predetermined position and/or orientation relative to each other such that a desired image is formed, the movement may be momentarily interrupted so that the desired image is visible for a short period, before movement recommences and the desired image dissolves into a moving pattern.

The patterns may consist of various elements such as spaced dots, lines, marks or the like, and the superpositioning of the templates bearing the patterns may form a desired image by the superposition, by the juxtaposition, or by a combination of superposition and juxtaposition of the elements forming the patterns.

The juxtapositioning of the pattern elements to form a desired image is particularly suitable where the patterns are monochrome; the additive effect of the

juxtapositioning of the monochrome pattern elements forms a monochromatic desired image.

The superpositioning of the pattern elements to form a desired image is particularly suitable where the patterns are polychromatic. For example the superposition of a red element over a green element (or vice versa) will produce an element of dark brown/black colour which will stand out from adjacent red or green dots to form a monochromatic dark brown/black desired image.

A combination of superposing and juxtaposing patterned elements may be employed to form a desired image, and the pattern on each template may be monochrome or polychrome.

The templates may be planar, or they may be of a curved shape, such as cylindrical, domed or ovular.

Successive desired images may be formed by providing a number of sets of separate templates successively moveable into predetermined positions and/or orientations relative to each other. Such templates might be formed in a number of loops or strips, the indexing movement of which provides a succession of images. Such an arrangement is particularly suitable for an advertising display and the concept of forming successive desired images may be employed to create animated films.

Each set of templates may incorporate more than one desired image, the separate images being formed by changing the relative positions and/or orientations of the templates. Moreover sets of templates may be arranged so that whereas it is only possible to discern all of the desired images when in possession of the complete set of templates it is possible to discern some of the desired images when in possession of only part of the set of templates. Such an arrangement is suitable to provide various levels of security, a person being provided with enough of the templates so as to be able to discern those images appropriate to their level of security clearance or authorisation. Alternatively, where a set comprises only two templates there may be provided a single, "master" template and a variety of second templates to be used

therewith, each of which display only a part, or a certain number of, the desired image(s).

The patterns on the templates may be monochrome or multi-coloured and the pattern wholly unrelated to the desired image(s) may be a random pattern or another image or picture, such as a background to the desired images; this pattern may be computer generated. The desired image may be monochrome or polychrome.

One template may take the form of the screen of a cathode ray tube or television set so that a first pattern is sent via a signal line, or broadcast, and displayed on the screen. A viewer in possession of a second, transparent or transpicuous, template can then hold this up to the screen so as to superpose the two templates and the patterns thereon so as to form the desired image(s). The broadcast of the first template may be for a very short, almost subliminal, period, so that the viewer has to record and replay the broadcast, pausing at the instant the first template is displayed and overlaying the second template on the screen so as to view the desired image(s). Such a system may be used for entertainment, advertising or promotional, or security purposes.

Alternatively, one template may comprise machine readable image such as optically readable data or magnetically stored data for example on a banknote or ticket. A second template may be stored in a computer. The image or data may be scanned to produce an analogue electrical signal which may then be input to the computer. The two templates may then be superposed or juxtaposed by the computer.

The invention will now be described by way of example and with reference to the accompanying drawing(s) in which:

Figure 1A shows a first monochrome patterned template forming part of a device embodying the invention;

Figure 1B shows a second monochrome patterned template forming part of a device embodying the invention;

Figure 2 shows the monochrome desired image formed by superimposing the patterned templates shown in Figures 1A and 1B;

Figure 3 shows a display apparatus incorporating a device embodying the invention, and

Figure 4 shows an embodiment of the invention for displaying a series of images.

Figures 1A and 1B show two monochromatically patterned templates 1, 3 forming a promotional display device in accordance with the present invention. Both templates 1, 3 are provided with a monochrome pattern, one of which is random and the other of which bears a desired image encrypted by subtracting from the desired image components of the random pattern such that the desired image is unrecognisable from the template. The patterns on both templates comprise a plurality of spaced monochrome pattern elements with a mass of irrelevant detail surrounding the desired image in order to disguise completely the image.

By superimposing the two patterned templates so that certain elements of both patterns are placed in juxtaposition, as shown in Figure 2, the desired image, in this case a monochrome promotional message indicating that a customer has not won a prize, becomes apparent.

One of the templates 1, 3 is formed of a transparent material so that the pattern on the other template 3, 1 can be seen therethrough. The patterns are formed by a suitably accurate and high-definition process such as silk-screen or a photolithographic process, the patterns consisting of elements such as dots, lines, marks, symbols of the like, or three-dimensional forms (not shown).

In the embodiment described above, the desired image is produced by a juxtaposition of pattern elements when the templates are superposed. It will be appreciated that a desired image may also be produced by the superposition of pattern elements. For the sake of illustration, the spaces between pattern elements will hereinafter be termed 'white'. The superposing of a red element over a green element (or vise versa), for example, will produce an element having a dark brown/black colour. Such an element will stand out from the surrounding background, whether that background be white (i.e. an area where white is superposed on white), red (white on red, red on white or

red on red) or green (white on green, green on white or green on green) so as to produce a dark brown/black desired image.

It will also be appreciated that a desired image may be monochromatic or polychromatic, that such images may be formed as described above or by a combination of the superposition and the juxtaposition of pattern elements, and that the pattern on each template may be polychromatic or, if it is monochromatic, each template in a set may be of a different colour. The use of coloured patterns further disguises the desired image(s), and is more eye-catching when used in a sign, novelty article or the like.

Figure 4 shows a pair of templates 5, 7 forming a display apparatus. One template 5 is driven by a motor 9 so as to rotate relative to the other template 7. As the template 5 moves into certain positions relative to the other template 7 the desired images are formed. Means (not shown may be provided to stop the motor 9 for a short while each time a desired image is formed so that the desired image can be studied before the motor begins rotating the template 5 again and the desired image dissolves. Whilst the template 5 is rotating the interaction of the patterns on the two templates 5, 7 creates an ever-changing and eye-catching display. Lighting (not shown) can be provided to backlight the display and the desired image(s). The template 7 is transparent and the other template 5 may be opaque, transparent, semi-transparent or translucent. The patterns on the templates 5, 7 may be formed of dots, lines etc., or, where both are transparent, the patterns could be in the form of polarisation patterns such that the appearance of a desired image is highlighted as the polarising filters align and the amount of light transmitted therethrough is suddenly increased/decreased.

Figure 4 shows a number of templates 11 formed on two loops 13, 15. The outermost loop 13 is transparent so that the patterns on the inner loop 15 can be seen when the templates 11 are superposed. The inner loop 15 could also be transparent, or semi-transparent or translucent, so that the desired image(s) can be illuminated from

behind so as to make an eye-catching display, such as in an advertisement or sign. Means (not shown) are provided for indexing the loops so that the appropriate templates thereon are superposed so as to represent a succession of desired images.

The examples described above are not exhaustive and numerous alternatives will be apparent to those skilled in the art. For example, the patterns may be in colour or monochrome, one pattern may be totally random or it may be an image, or picture, in the form of a background to the desired image, so long as it is wholly unrelated thereto, and the templates may be curved as well as planar. Each set of templates may form one or more desired images.

It will be apparent to those skilled in the art that the pattern which is wholly unrelated to any desired image could be generated by computer. Where that pattern is itself an image, or picture, similar means may be used so as to encrypt the desired image(s) in dependence on the pattern.

Devices embodying the present invention have many applications, such as advertising, promotion, education, the encryption of information for use as a security pass, for example, or as novelty articles, games, puzzles or the like. In one example of the use of the invention as a security device a first template comprises machine readable data such as optically or magnetically readable data for example on a banknote or ticket and a second template is stored in a computer. When the first template is scanned an analogue electrical signal is produced and is input to the computer. The computer then superposes or juxtaposes the two templates to form the desired image. Moreover, the invention may be employed so as to form a succession of desired images to create an animation effect, for example to produce an animated film. One template may be broadcast and displayed on a television screen so that a viewer with a matching second template may view, or form, the desired image(s).

CLAIMS

1. A device for displaying at least one image comprising a set of at least two patterned templates, at least one of the templates being at least partially pervious to vision, the templates being movable independently of each other into predetermined positions and/or orientation(s) with respect to each other in superposed relationship so that the combined patterns form the image(s), wherein the pattern on at least one template is wholly unrelated to any image(s) and wherein the pattern(s) on the other template(s) represents the image(s) in an incomplete and unrecognisable form.

2. A device as claimed in claim 1 wherein at least one template is at least partially transparent.

3. A device as claimed in claim 1 or 2 wherein each pattern comprises spaced pattern elements, the image(s) being formed by the juxtaposition of predetermined pattern elements when the templates are superposed.

4. A device as claimed in claim 1 or 2 wherein each pattern comprises spaced pattern elements, the image(s) being formed by the superposition of predetermined pattern elements when the templates are superposed.

5. A device as claimed in claim 1 or 2 wherein each pattern comprises spaced pattern elements, the image(s) formed by a combination of the superposition and juxtaposition of predetermined pattern elements when the templates are superposed.

6. A device as claimed in any preceding claim wherein the pattern on the template which is wholly unrelated to any image is a random pattern.

7. A device as claimed in any of claims 1 to 5 wherein the pattern on the template which is wholly unrelated to any image is a picture or image.

8. A device as claimed in any preceding claim comprising means for moving at least one template in relation to the other template(s) in order to bring the template into the predetermined position(s) and/or orientation(s) in order to form the image(s).

9. A device as claimed in claim 8 comprising means for momentarily interrupting the movement of the or each template when a image is formed.

10. A device as claimed in any preceding claim wherein the templates are planar.

11. A device as claimed in any preceding claim comprising a number of templates successively moveable into predetermined positions and/or orientations relative to each other in order to form a succession of images.

12. A device as claimed in any preceding claim wherein the patterns consist of dots, lines, marks, symbols, polarising materials or three-dimensional forms.

13. A device as claimed in any preceding claim wherein the patterns are monochrome.

14. A device as claimed in any of claims 1 to 12 wherein the patterns are polychrome.

15. A device as claimed in any preceding claim wherein the pattern on the template which is wholly unrelated to any image is computer-generated.

16. A device for encrypting at least one image comprising a set of at least two templates, at least one of the templates being partially pervious to vision, means for applying a pattern which is unrelated to any image to a first template, means for reducing the image(s) to an encrypted pattern in dependence on said pattern on said first template, and means for applying the encrypted pattern to a second template.

17. A device for decrypting at least one encrypted image comprising a set of at least two templates, at least one of the templates being partially pervious to vision, including a first template bearing a pattern which is unrelated to any decrypted image, and a second template bearing a pattern related to the encrypted image, wherein alignment of the templates into predetermined position(s) and/or orientation(s) with respect to each other in superposed relationship combines the patterns on the first and second templates to decrypt the encrypted image.

18. A device according to claims 16 or 17 in which the encrypted pattern is formed by subtracting from the image components thereof in dependence on the pattern on the first template.

19. A device substantially as hereinbefore described with reference to the accompanying drawings.

20. A method of encrypting at least one image comprising reducing the image(s) to an incomplete and unrecognisable pattern by subtracting from the image(s) components thereof in dependence on at least one other pattern, said other pattern being wholly unrelated to the image(s).

21. A method of encrypting at least one image comprising reducing the image(s) to an incomplete and unrecognisable pattern on at least one template by subtracting from the image(s) components thereof in dependence on the pattern on at least one other template, the pattern on the said other template being wholly unrelated to the image(s).

22. A method of displaying at least one image comprising reducing the image(s) to an incomplete and unrecognisable pattern on at least one template by subtracting from the image(s) components thereof in dependence on the pattern on at least one other template, the pattern on said other template being wholly unrelated to the image(s), at least one of the templates being at least partially pervious to vision and moving the templates into predetermined

position(s) and/or orientation(s) with respect to each other in superposed relationship so that the combined patterns form the image(s).

23. A method of encrypting at least one image substantially as hereinbefore described.

24. A method of displaying at least one image substantially as hereinbefore described.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	12	Application number GB 9510707.4
Relevant Technical Fields (i) UK Cl (Ed.N) B6A (ADE) G5C (CAC, CAD, CAE, CAX, CBJ, CBK, CBL, CCJ, CCC, CDBK, CDX) (ii) Int Cl (Ed.6) B42D, G09F		Search Examiner R A H CASLING Date of completion of Search 11 AUGUST 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)		Documents considered relevant following a search in respect of Claims :- 1-15, 17-19, 22

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	**P:**	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	**E:**	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	**&:**	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2230228 A	(SOMERSET GALLERIES) see page 1 line 23 et seq and page 8 line 9 et seq	Claims 1-8, 10, 12-14, 17, 22 at least
X	GB 2163999 A	(BISHOP) see page 1 line 13 et seq and page 1 line 86 et seq	Claims 1-8, 10-14, 17, 22 at least
X	GB 1333579	(PHOTO-MOTION) see page 3 line 12 et seq and page 9 line 65 et seq	Claims 1-6, 8, 10, 12, 13, 17, 22 at least
X	US 3745966	(SEAGER) see 3 line 21 et seq	Claims 1-6, 8, 10, 12, 13, 22 at least

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).